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Advances in European Assistive Technology service delivery and recommendations for further improvement

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Abstract. Seventeen years ago the European Commission funded HEART (Line C) project released a report on rehabilitation technology service delivery, describing the processes from 16 countries and making recommendations for improvement by market stimulation and quality assurance.
Service delivery of rehabilitation technology, now more commonly referred to as Assistive Technology (AT), has advanced since the 1994 report. Highlights include the establishment of the EASTIN network of AT databases, expansion of systems that facilitate user choice, and a stronger sector identity promoted through the AAATE.
Policies and attitudes toward disability have also changed at a societal level over the intervening years, reflected in key documents such as the UN Standard Rules, the ICF, the UN CRPD and the European Disability Strategy 2010–2020. People with disabilities can expect to be provided with information about and access to technologies and services enabling their participation and integration in society.
Yet discussion about issues including the ageing population, keeping up with technological advances and containing costs in health and social care budgets, is not new. The message is the same as it was in 1994; we need to work together to meet the challenges. The difference now is that, with progress slower than expected, the voices are more urgent.
Aim: This paper reflects the advances in service delivery since the HEART study, the impact of European policy and strategy on development in the AT field, and the current challenges the sector faces. It is intended to stimulate further collaboration and improvements in European AT service delivery.
Methods: National contacts from the AAATE were surveyed about the current status of AT service delivery in their respective countries, and asked to comment on the improvements since 1994 as well as the new and continuing challenges and priorities. Survey responses were analysed and recommendations made for further discussion.
Results: 13 responses were received, all reporting improvements in elements of AT service delivery, differing in focus across countries. Users frequently have access to AT information but their involvement in decision-making varies. The seven essential steps and six quality criteria for service delivery from the HEART study retain relevance for most respondents, but their use in practice remains limited. The participation of AT practitioners and services in professional development and networking varies from individually organised activities to requisite programmes, and from local to international involvement.
Conclusion: European countries have AT service delivery systems that vary in their structure and sophistication, but share some common challenges in meeting the needs of AT service users. Several recommendations are made to inform further discussion and encourage the various stakeholders in AT policy and practice to work collaboratively in improving service delivery across Europe.

Keywords: Assistive Technology, service delivery, quality, Europe

1. Introduction

Europe has an ageing population and faces the challenge of meeting the needs of citizens who are living with disabilities in a context of stressed family and public care resources. Increasing attention is being given to the role of technology in meeting this challenge. Assistive Technology (AT) is used to facilitate individuals' access to and participation in personal, work and social life domains. In Europe, AT is most often pro-

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vided to individuals through health and social care services, but is increasingly available for direct purchase by consumers.

The importance of service delivery was recognised in the 1994 HEART study (Line C) [1], which gathered information from 16 European countries in order to make recommendations for collaboration and improvement. The structure of each country's system was described with consideration for the context and historical influence of political and social policy, and seven essential steps in service delivery were described (see Fig. 1). Six criteria were defined for evaluating the quality of service delivery systems (see Table 1).

The HEART study exposed the fragmentation of service delivery across Europe, varying depending on the user's diagnosis, professionals involved in provision, and the country or region. The variations and inconsistencies may inhibit equality of access, benchmarking for quality assurance, and awareness of services and devices available. The report therefore included recommendations for the improvement of service delivery systems at a local, national and European level. It emphasised networking between practitioners and users through formal training and events and publicly available resources, and the establishment of procedures and funding to facilitate greater user influence in service development. Other recommendations included the use of common terminology, development of quality assurance systems and cost-effectiveness analyses and cross-border service agreements. The authors called for increased attention to AT users with uncommon disabilities and the servicing and repair of AT devices.

Since 1994 the availability of various technologies and devices has increased, and society's values and expectations for the quality of life, access and support provided for people with disabilities have changed. The adoption of the Standard Rules on the Equalization of Opportunities for Persons with Disabilities [2] by the United Nations General Assembly in 1993 represented a commitment and functioned as an instrument for government policy-making, specifically addressing awareness of and access to needs-based provision of AT [3]. The United Nations Convention on the Rights of Persons with Disabilities [4] has provision for monitoring and enforcement of rights. Most European countries (and the EU) have ratified the Convention [5], and are thus obliged to promote the use of assistive technologies suitable for people with disabilities where there are barriers to accessibility. More recently, the promotion of assistive devices is included as one of the aims of the European Disability Strategy (2010–2020) [6], which explicitly strives for the independence and integration in society of people with disabilities.

The legal and policy changes in the field of disability coincided with a paradigmatic shift from the medical notions of diagnosis and cure to the bio-psychosocial model of functioning and integration. This was apparent in the International Classification of Impairments, Disabilities and Handicaps (ICIDH), first issued in 1980 by the World Health Organisation (WHO), then revised to the ICIDH-2 [7]. Its successor, the International Classification of Functioning, Disability and Health (ICF) [8], was officially endorsed in 2001 and serves as both a model and classification for functioning. The ICF provides a multidisciplinary and client-centred approach and common language for describing the relationship between an individual's health conditions, usual activities, and participation in society, in the context of environmental and personal factors. It has been adopted and applied in research, policy and clinical practice, and discussed as a model for AT service delivery [9,10].

Following on from the HEART study, European projects to improve and structure AT service delivery have developed protocols and databases, made publicly available through websites. The Empowering Users Through Assistive Technology (EUSTAT) focussed on user education and identified critical factors to be considered in user-centred service delivery [11]. The European Assistive Technology Information Network (EASTIN) [12] hosts seven national AT databases and is expanding to be available in multiple languages and modes, increasing opportunities for users and practitioners to access information [13]. It is also planned to act as a portal for ICT-related freeware and services across Europe, as part of the European Thematic Network on Assistive Information and Communication Technologies (ETNA) [14].

There is, however, concern that continuing fragmentation of the AT market and service delivery models makes it difficult to access services or compare devices [15]. Adding to that, a general lack of public and professional awareness means that AT interventions are often not considered by general or referring practitioners, or may not be well matched to individuals' needs. A European Commission study on Access to Assistive Technology in the European Union highlighted the variations in the AT provision processes among member states, and emphasised the need to improve, coordinate, and structure information and advice, and assessment procedures [16].

In the context of limited funding allocated to the organisation of service delivery at a national and Euro-

Fig. 1. Seven steps of service delivery for Assistive Technology from the HEART study.

Table 1
Six criteria for good service delivery systems from the HEART study

1	Accessibility	Users know where to seek help, and can access information to understand the system, without discrimination.
2	Competence	Personnel have knowledge and skills necessary to support the service users, based on training and ongoing learning.
3	Coordination	AT systems are connected to other sectors in society, practitioners are connected across services, and individual users can move through all steps in the service delivery process.
4	Efficiency	Solutions are available to the greatest number of people, using the available resources at the lowest cost and in the shortest time.
5	Flexibility	Systems respond to the differing needs of individuals, allow for testing of new devices, and support research and development to meet new needs.
6	User influence	Users are consulted during service delivery, involved in decisions and policy-making, have legal rights that can be enforced, and are represented in organisations.

pean level [17], formal networking and industry representation have been recommended as strategies to strengthen the AT sector in Europe [18]. The ImPaCT project is mapping the provision of Person Centred Technology and plans to bring together various stakeholders in a network for improved information exchange and development of technologies and services based around user needs [19]. The MURINET project reviewed practices of AT selection in Europe [20] and developed an ICF-based tool to guide non-expert practitioners through the service delivery steps of assessment, typology and selection [21]. The Association for the Advancement of Assistive Technology in Europe (AAATE) supports the AT sector internally through networking and education [22], but active involvement in legislation and policy development is important for improving AT service delivery systems primary health and social care systems.

The projects described above have generated greater knowledge and resources than were available at the time of the HEART report, but it is not clear whether or how this has improved AT service delivery across European countries. This paper aims to report on the current status of service delivery across Europe at a national level, to highlight the initiatives and improvements, and bring together the concerns from each country. The results and analysis are presented in order to stimulate debate and action, to steer future efforts in AT service delivery to the salient issues and promote shared strategies for ongoing improvement.

2. Methods

National contacts from AAATE member countries were surveyed about the current status of AT service delivery in their respective countries. A questionnaire was developed and made available on a website. It consisted of eight questions based on the findings and recommendations of the HEART study. The first six questions comprised a primary statement, where respondents were required to select the most appropriate answer from a five-point Likert scale, and sub-questions in an open format, where respondents were invited to describe and comment based on the situation in their country. The last two questions were in open format, inviting respondents to describe the improvements in AT service delivery specific to their country, and then to report the issues important to them. The 23 AAATE national contacts received an email request to participate in the study, with background information about the HEART study and a link to access the questionnaire. The questionnaire responses were collated on a spreadsheet for analysis.

3. Results

Responses were received from 13 national contacts, each representing a member country of the AAATE. The results for each question are summarised below:

3.1. User access to information

Ten respondents reported that users have access to AT information either *almost all the time* or *frequently*.

Information is usually available via websites or from service providers, both government and commercial. Some welfare or social services provide information, in addition to specialised rehabilitation and AT centres, conferences or trade fairs. People with uncommon disabilities are most likely to access AT information through peer support or user groups, or when individually approaching health and social care practitioners. Some respondents highlighted the translation of information into local languages and accessible formats as a barrier to access.

3.2. User involvement in decision-making

Only one respondent (Italy) reported *infrequent* user involvement in decision-making, the rest reported involvement either *some of the time* or *frequently*. User involvement was described in different stages of service delivery, from initiating assessment and proposing AT for administrative approval, to selecting devices from commercial providers. The extent of users' involvement also varies, from leading the process, to passive participation in assessments conducted by practitioners. Respondents attributed variations in user involvement to limitations in time, funding, knowledge of users and attitudes of practitioners. Users may face barriers in physical access to services (Hungary, Slovakia), or limited choice through pre-existing agreements between fund-holders and suppliers (Netherlands), or when holding different opinions than practitioners (Denmark, Italy and Sweden).

3.3. Evaluation of services

While all respondents except one (Israel) reported the continued relevance of the quality criteria described in the HEART study (Table 1), which are part of the curriculum for a post-graduate AT course in Italy, only three respondents reported the use of evaluation or quality improvement systems in AT services as *frequent* or *almost all the time*. One respondent (Hungary) suggested affordability as an additional criterion. The inclusion of maintenance and servicing of AT varies across and within countries, very much dependent on the context of AT provision.

3.4. Practitioner training and development

According to most respondents AT practitioners participate in training and professional development activities only *some of the time* or *infrequently*. Practitioners may be supported by specialists or on-the-job training, usually arranged at an individual level. Barriers to practitioner competence include the availability of certified and independent training, and limited awareness of and emphasis on the knowledge and skills development of practitioners working with AT.

3.5. Common steps and terminology

Responses varied regarding the use of common steps and terminology in AT service delivery, but all respondents except one (Israel) agreed on the continuing relevance of the 7 steps described in the HEART study. Several respondents (Cyprus, Italy and Netherlands) noted the lack of attention given to the step of "follow-up" in practice. One respondent (Hungary) suggested they were more theoretical, and another (Israel) responded that the steps had never been relevant. Practitioners' use of common terminology across disciplines was difficult for respondents to gauge, several indicated the existence of formal or legal terms, but also variance by region, type of disability, and field of practice (e.g. education or rehabilitation).

3.6. Networking and information sharing

Responses were divided on this issue, with eight respondents reporting the coordination, networking and information sharing between AT services as *infrequent* or *almost never*, while the remaining five reported it as *frequent*. Electronic media is most frequently used, and much of the networking is informal, involving only individuals participating in personal or professional networks. Several respondents described commercial interests and competition as a barrier to information sharing between industry, research and policy sectors, as well as a lack of dedicated structural support and resources.

3.7. Progress

Respondents described progress in their countries' AT service delivery. Improved awareness and knowledge was reported in users and practitioners, along with increased user demand and access to AT information.

Cyprus reported the development of AT services that did not exist until 2004 (through the Ministry of Education and Culture), increased AT availability and information for users, and more involvement in AT research and development activities. An AT database and

programmes run by non-profit and voluntary organisations have advanced service delivery in Israel. Austria reported improvements in the quality of initial training and numbers of teachers and therapists receiving AT training, as well as the earlier consideration of AT interventions. More up-to-date AT is available now in Germany, and market expansion has allowed for more options in mobility devices and AT software. Hungary reported increased access to software for users with visual impairments and greater use of IT systems in public buildings, while Slovakia reported good networks for the blind and visually impaired population.

Sweden reported increased flexibility, in terms of user choice and the availability of AT to support people with cognitive disabilities. Demand for AT in Portugal has increased as a result of discussions and information targeted at users, and there are plans to implement an informatics system to improve AT service delivery. General improvement in the quality of devices and service delivery was reported in the Netherlands, as well as a move towards welfare rather medically-oriented provision, focussing on participation. Greater user involvement and the use of systems was reported in Denmark. Finland has developed regional AT centres and published quality recommendations for AT services in 2003 and national criteria for AT provision through specialist healthcare services in 2005.

3.8. Issues and challenges

Most respondents reported challenges facing AT service delivery at both national and European levels. The three main issues reported were: training, funding, and awareness in policy and practice.

The ongoing training of AT practitioners was noted as an issue by both Denmark and Austria, as well as the introduction of new devices in the Danish service delivery systems. The use of outcomes and evidence was noted as a challenge in the Netherlands, as well as the use of protocols and information support to improve processes. Germany noted that the personal budget system has not yet been successfully implemented.

The lack of standards and the inconsistencies in service delivery approaches (including user support) across sectors were noted as barriers in Cyprus. The respondent suggested that European level guidelines for AT service delivery might be helpful for national policy-making. This was also suggested as a European challenge by the respondent from Hungary, particularly in relation to communication devices and transport systems. Encouraging employers to invest in AT for their employees was noted as an urgent national issue with strong potential for Hungary, while the high costs of AT compared to mainstream technologies was reported by the respondent from Portugal as a barrier at a European level.

The respondent from Sweden suggested that awareness raising of the value of AT to society (in terms of reducing costs in other sectors) and benefits to the quality of life of individuals is required, in order for AT provision to be established as standard care within health systems. The current challenge in Slovakia, according to the respondent, is the implementation of an accessible international AT database as part of health and social services, with the cooperation of insurance companies. A lack of progress in legislation since 1999 was reported as a barrier to improvement in Italy.

4. Discussion

The results of the questionnaire point to the continuing relevance of the HEART study findings and recommendations, and also highlight issues that have emerged in the years since the report.

4.1. Common steps and criteria for good service delivery systems:

Almost all respondents agreed that the 7 steps of service delivery (Fig. 1) and the 6 criteria for good services (Table 1) remain relevant, yet their use is practice is inconsistent and incomplete. The suggestion that affordability be added to the criteria should be considered, though the original HEART study included it in the criterion “Accessibility”, it may receive more attention when addressed separately. One respondent (Israel) reported that the 6 quality criteria have been superseded by more recent quality systems, though these were not specified.

The use of formal systems for guiding practice from initiative to follow-up and maintenance, and ongoing evaluation and improvement planning may provide a more concrete approach to the use of the HEART steps and criteria. In hospitals this is common through the use of clinical pathways or protocols and formal Continuous Quality Improvement or Total Quality Management systems. Compliance is regularly assessed through clinical audits and external or peer evaluation, and recognised through accreditation. Whether the existing quality systems are flexible or comprehensive enough to cover the criteria developed specifically for AT service delivery could be explored, as well as the actual use, or barriers to use, of such quality systems in countries that reported infrequent use of evaluation.

4.2. Mainstream and/or assistive technologies

The increased blurring between mainstream and assistive technologies was not specifically mentioned by respondents, but is another issue that AT service delivery systems must tackle. Mainstream technologies such as GPS devices or automatic work-processing functions in software are in effect AT when they assist an individual to function in usual activities that they might otherwise be unable to do, or require help to complete. While mainstream technologies have a broader market and therefore more price competition, they may remain inaccessible or unknown to people with disabilities without service delivery systems funding the purchase and supporting the individual calibration and training in their use.

4.3. Accessibility of information

The significant increase of information on AT is a notable improvement since the HEART study, largely attributable to the growth in access to and use of the internet. Yet at the same time frequent user access to AT information was reported across most countries, concern was also expressed about the gap between the existence of AT and its attainment by users. Trade fairs and web pages demonstrate new and emerging technologies from across the world, increasing users' and practitioners' awareness of the possibilities, while many services continue to fund only a selection of devices, restricted through exclusive contracting or testing requirements. This may result in increased demand and more obvious unmet needs.

Online AT databases (e.g. EASTIN network sites) may provide more realistic and country-specific sources of information, but are not easy to understand and provide little guidance for the searching users and practitioners. Databases and lists may also draw practitioners' and users' attention away from matching technology to the individual situation, instead beginning with a desired or prescribed device and attempting to modify the user to fit. The current EASTIN-CL project aims to increase the user-friendliness and provide intuitive access for users and practitioners searching the databases [13], and example being the UK information service www.livingmadeeasy.org.uk, which has a problem-based search function. More targeted means of navigating through databases, based on individual functioning and context may increase accessibility.

4.4. Coordination and competence

Networking and information sharing between services is predominantly through informal coordination, dependent on individuals' personal or professional networks. While this is a recognised mode of diffusing good and innovative practices, it is not comprehensive. More active and formal dissemination methods, supported by policy and structurally resourced, may more quickly reach and support those services that are less well connected.

Increased attention is being given to the training of practitioners (e.g. technicians, therapists, teachers) in some countries, but concern was expressed about the low priority and limited resources given to ongoing development activities. Formalisation and recognition of continuing professional development activities, such as the certification and continuing education system used by RESNA [23], and of training providers should be considered. This may raise the profile of AT provision as a specialty and facilitate more equal access to quality AT service delivery. A shared understanding of competence, and coordinated effort and resources is required for this, initiated and supported at a European level.

4.5. User influence

The rights of users have progressively been formalised, as noted in the introduction, and also as a legal requirement in AT service delivery in some jurisdictions (e.g. Sweden). The enforcement of the rights however is less clear, and is still restricted by inflexible systems, attitudes of practitioners, and the awareness and confidence of users, or their representative organisations. User influence is perhaps an even more important consideration now in assessing the quality of AT service delivery, given the growing gap between existing AT, and AT that users are eligible to obtain.

Personal budgets were mentioned by one respondent as having had limited success, but may benefit from reflection on the alternatives available when implementing a personal budget system. Variations on voucher systems with an element of user choice were described in the recent report from the Swedish Institute of Assistive Technology, following a mapping study of 9 European countries and regions [24]. AT practitioners determine eligibility for AT vouchers following an individual needs assessment in Sweden, and in Finland vouchers can only be redeemed at authorised centres. Users are given the option of an AT lease including servicing or ownership with responsibility for servicing in England, whereas in Norway the User Pass provides all steps in service delivery but the authority maintains ownership of the AT. Lombardy in Italy allows the voucher to be redeemed for items or services

Table 2
List of countries that participated in either the HEART study or 2011 survey, or both

HEART study and 2011 survey	HEART study only	2011 survey only
Denmark	Belgium	Austria
Finland	France	Cyprus
Germany	Greece	Hungary
Italy	Ireland	Iceland
Netherlands	Luxembourg	Israel
Portugal	Norway	Slovakia
Sweden	Spain	
	Switzerland	
	United Kingdom	

other than those regarded as AT through flexible subsidy systems. The voucher system in the Netherlands is only rarely used, and like most is an alternative or supplement to existing AT provision systems. The various systems offer strong and weak points for both users and funding organisations, and apply to only certain types of AT (e.g. hearing aids, mobility aids). This may be a relevant topic for further comparative research.

4.6. The role of the commercial sector

Many respondents mentioned the commercial sector in their responses to the questions about access to information, networking and information sharing, and practitioner training. Market expansion and greater cooperation between users, research and industry are desirable in the European AT sector, and may be more formally supported through a representative peak body [18]. In service delivery however, the competing business interests of AT dealers and health insurers must be recognised, and differentiated from the role of independent advice and service providers. This is important for users accessing information from various sources, and funding bodies seeking to contain costs by outsourcing some parts of the service delivery process, while ensuring AT provision that is driven by user needs.

4.7. Limitations of this study

This study reflects on the issues raised when the HEART report was released in 1994, and presents a snapshot of current trends and issues in AT service delivery in Europe. National contacts from the AAATE were surveyed via an internet questionnaire, and only 13 completed the questionnaire from the 23 invited. Not all of the 16 countries involved in the original HEART study responded to the questionnaire, and some of the countries surveyed in this study were not involved in the HEART study (Table 2). The survey results suggested some alternative perspectives on AT service delivery that invite further attention. Respondents were asked to answer questions from the perspective of their country and their own experience, but may not have had up-to-date knowledge of or access to all the relevant practices, and were given only several weeks to respond. More rigorous sampling would have included several practitioners and users from each of the countries for a more representative population. The results are not conclusive, but point to issues that require discussion. The intention of the study was to sample opinions and concerns from across Europe in preparation for a debate, and to target any further research on this topic.

5. Conclusion

AT service delivery in Europe at present seems to be as fragmented as it was 17 years ago, with various systems and stakeholders across countries, and variations or inconsistencies within countries. But all countries reported progress in AT service delivery, be it in the provision of information to users, the training of staff, or the introduction of specialist AT services. Some countries appear to have more sophisticated and formalised structures for providing AT, implying learning opportunities through international networking. Ongoing challenges for all countries surveyed include: evaluating the quality of services; having meaningful user involvement; and sharing information and expertise within the field and externally.

The following five points are advanced for discussion and debate between policy makers and key stakeholders in AT service delivery at a European level:

1. Review the accessibility, in terms of ease of understanding, of AT information and services for both users and practitioners. Consider the provision of independent and country-specific infor-

mation sources and the use of tools to support database navigation based on individual needs.
2. Explore the applicability of the HEART service delivery quality criteria within existing evaluation systems. Develop recognition or certification systems for AT services quality reviews and for practitioners' training and ongoing development activities.
3. Assess the reality of user involvement and how rights are enforced and decision-making shared in practice.
4. Reconsider the role of personal budgets and compare the variations within and across jurisdictions. Develop strategies for how they can be used to complement service delivery and integrate with mainstream technologies.
5. Differentiate the roles of independent (or not-for-profit) service delivery organisations and commercial or insurance. Facilitate networking between different stakeholders while recognising competing interests.

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